

Name _____

Unit 3.1 Exam

AP Biology

2017 - 2018

This exam will be returned to you so be sure to annotate it while testing so you can understand any misconceptions when it is returned to you for review.

There are 3 multiple choice questions and 1 free response question.

The exam must be completed within the class period

- The sole genetic material of certain viruses is sometimes RNA, going against the typical idea that all living things contain DNA as their genetic code. Upon studying numerous viruses, which of the following would be an appropriate question to determine the identity of their genetic material?
 - Do the viruses only infect human hosts?
 - Are there distinct 5' & 3' ends to their genetic material?
 - Are there both purine and pyrimidine nitrogen bases?
 - How many oxygen atoms are in the 5-carbon sugar?
- Polymerase Chain Reaction (PCR) is a useful tool in biotechnology. A crucial procedure involves elevating the temperature to a certain point and then lowering the temperature in cycles, known as thermocycling. What is the most likely role of thermocycling?
 - Heating allows the phosphodiester bonds to break and cooling reforms them.
 - Heating promotes breaking of hydrogen bonds and cooling promotes their reformation.
 - Heating destroys bacterial enzymes that could interfere with PCR.
 - Heating improves the rate of DNA transcription & translation.
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		Second Base in Codon				
		U	C	A	G	
First Base in Codon	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G
	A	AUU } AUC } Ile AUA } AUG Met or Start	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G

5' -GACCGCAUGGUGACGAAAUUUGGCCAUUAA-3'

- Based on the universal genetic code, which of the following represents the correct polypeptide that will result from translation of the mRNA molecule shown, beginning with the first available start codon?
- Asp-Arg-Met-Val-Thr-Lys-Phe-Gly-His
 - Met-Arg-Asp-Stop-His-Gly-Phe-Lys-Thr-Val
 - Met-Val-Thr-Lys-Phe-Gly-His
 - Val-Thr-Lys-Phe-Gly-His

Free Response

The gene *p-AZN*, occurring naturally in some plant species, codes for a protein hormone that is excreted onto the surface of their leaves. The protein contains a large number of lysine amino acids, which are positively charged, thought to interfere with the nerve cell proteins of insects which are negatively charged. In an attempt to improve crop yields, horticultural scientists performed a transformation experiment where they inserted the *p-AZN* gene into the DNA of a species of corn to make them resistant to damage from insects. The team then extracted samples of the corn DNA, corn leaf surface protein and nerve protein from an insect that had fed on the corn leaves from the experiment. On the electrophoresis diagram on your answer sheet, there are 3 loading wells (A, B & C) in the center of a gel and the regions where a negative current and a positive current would be applied are shown. The corn DNA sample was loaded into well A, the corn leaf surface protein sample was loaded into well B and the insect nerve protein sample was loaded into well C.

- On the electrophoresis diagram, **draw an arrow** to indicate the direction of each sample's movement from wells A, B & C through the gel if the transformation was successful. **Provide reasoning** for your placements of each arrow.
- Identify** the site of the hormone's production and **describe** TWO subsequent steps for it to reach its destination.
- Suppose the scientists also inserted this gene into a bacterium. **Describe** ONE difference and ONE similarity between the corn and the bacterium during their processes of:
 - DNA Replication
 - Gene Expression
- Not including the information from the prompt above, **Identify** TWO products of genetic engineering that are beneficial. For each of the products also **evaluate** a potential risk.

Answer Sheet

1. _____ 2. _____ 3. _____

a.

b.

[illegible]

A diagram consisting of three rectangular boxes arranged horizontally. Each box contains a single letter: 'A' in the leftmost box, 'B' in the middle box, and 'C' in the rightmost box. The boxes are separated by equal gaps.

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[illegible][illegible]